1982 ANNUAL REPORT

The Coordinating Committee of Maritime Electrical Utilities

presented to
The Council of
Maritime Premiers

RAPPORT ANNUEL 1982

Comité coordonnateur des entreprises de l'électricité des provinces maritimes

présenté au
Conseil des premiers ministres
des Maritimes

Maritime Electric Company Limited
The New Brunswick Electric Power Commission
Nova Scotia Power Corporation

Maritime Electric Company Limited
La Commission d'énergie électrique du Nouveau-Brunswick
Nova Scotia Power Corporation

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THE COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

1982 ANNUAL REPORT

TO

THE COUNCIL OF MARITIME PREMIERS

March 31, 1983

Premier J.M. Buchanan
Premier R.B. Hatfield
Premier J.M. Lee

Sirs:

It is with pleasure that we, the members of the Co-ordinating Committee of Maritime Electric Utilities, submit our Annual Report.

The Co-ordinating Committee of Maritime Electric Utilities (CCMEU), having now completed its second full year of operation, feels that its existence has helped to promote and ensure full co-operation among the region's electric power utilities.

We also believe that CCMEU serves a useful role in identifying, discussing, and quantifying the benefits of such co-ordination for the Council of Maritime Premiers.

Respectfully,

G.L. TITUS
Chairman, CCMEU
New Brunswick Electric
Power Commission

D.G. BROWN
Secretary, CCMEU
Nova Scotia Power Corporation

J.H. REYNOLDS
Maritime Electric Company
Limited

TABLE OF CONTENTS

	PAGE
THE COMMITTEE	i
TERMS OF REFERENCE	iii
SUMMARY OF FINDINGS	iv
OPERATING SUBCOMMITTEE REPORT	Section I
PLANNING SUBCOMMITTEE REPORT	Section II
RESEARCH AND DEVELOPMENT SUBCOMMITTEE REPORT	Section III

- THE COMMITTEE -

THE COMMITTEE

The membership of the Committee shall consist of one representative, and an alternate, from each of the electric utilities. Observers delegated by each Provincial Government and the Government may attend Committee meetings.

THE COMMITTEE MEMBERS ARE:

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- TERMS OF REFERENCE -

COMMITTEE TERMS OF REFERENCE

The responsibility, structure, and operation of the Committee is intended to ensure a continuing high degree of cooperative effort among the electric utilities of New Brunswick, Nova Scotia, and Prince Edward Island in the development and operation of an economic and efficient interconnected regional electric power system.

Responsibilities of the Committee shall include:

(1) Development of coordinated load growth forecasts on an annual basis.
(2) Identification and evaluation of regional electric utility development opportunities.
(3) Development of optimum coordinated short and long range utility expansion plans.
(4) Coordination of operations of the three utility systems with the objective of minimizing total regional generation costs, and improving security of supply.
(5) Coordination of electric energy research and development, conservation and related activities of a regional nature.
(6) Provision of a regional focus for operations coordination with neighbouring utility systems.
(7) Such matters as may be referred to the committee by the Council.

The Committee shall meet at least quarterly with locations normally rotating among the three provinces.

The Committee shall submit a written report at least annually to the Council of Maritime Premiers.

- SUMMARY OF FINDINGS -

SUMMARY OF FINDINGS

The committee feels that the terms of reference provided by the Council continue to be satisfactory and will result in the ability to provide valuable information to both the Council and the utilities in matters relating to the efficient regional development and operation of the maritime electric power systems.

The individual Operating, Planning and Research and Development Subcommittee reports provide an overall appreciation of the Committee results.

Highlights from these subcommittee reports reveal the following:

REGIONAL OPERATIONS SUBCOMMITTEE REPORT

Energy exchanges among the three utilities during 1982 resulted in a total reduction in operation cost, hence a saving to utility customers of some 10.9 million dollars. Energy was delivered to Maritime Electric Ltd. from the Dalhousie Unit 2 in N.B. in which they have a 10% ownership participation.

Maintenance coordination is an ongoing activity which provides economies in operations by the exchange of energy, reduction in overtime for maintenance and efficient management of fuel inventories. Information is also routinely exchanged on spare parts for apparatus and specialized test equipment to improve regional system maintenance efficiency.

REGIONAL PLANNING SUBCOMMITTEE REPORT

The Planning Subcommittee has prepared a load forecast for the region extending to the year 2000 by combining the load forecasts of the maritime utilities. The expected long-term average annual growth for the period is 3.2 percent.

SUMMARY OF FINDINGS Cont'd)

The load and resources review summarizes the existing and planned additional generating capacity in the region and evaluates its capability to meet the forecast regional load together with the required reserve margin.

The maritime electric utility systems, together with the currently-planned generation additions, are forecast to have sufficient resources to satisfy the reserve criteria for both sustained and peak electrical capability to near the end of the century.

The regional approach to planning enables the optimization of future additions by considering all practical regional generation and transmission alternatives, regardless of the ownership or control of the facility.

REGIONAL RESEARCH & DEVELOPMENT SUBCOMMITTEE

A regional approach to utility research and development is now a reality. The Research & Development Subcommittee foresees the possibility of future joint proposals and joint projects along with enhanced sharing of information developed from individual utility R&D projects.

A review of current R&D activity reveals the following projects in each utility:

New Brunswick Power

- flue gas desulphurization
- coal washing
- coal-water mixture combustion demonstration
- waste heat utilization
- conservation and renewable energy

SUMMARY OF FINDINGS (Cont'd)

Nova Scotia Power

- marginal cost-based peak load pricing and load control study
- fluidized-bed combustion
- atmospheric fluidized-bed studies
- coal-liquid mixtures
- fly ash testing and marketing
- Annapolis Tidal project
- wind generation experiment
- wind resource monitoring
- heat pump - Guysborough regional office
- fibre optics in substations

Maritime Electric

- wind energy conversion system at Mount Pleasant
- wind test site at North Cape

The co-ordination of R&D activities and results through the Subcommittee was seen to be of considerable value to the utilities, both in avoiding duplication of R&D activities as well as assuring an exchange of information. Co-ordination of shared regional R&D projects is seen as a possible future role for the subcommittee.

- SECTION I -

REGIONAL OPERATING SUBCOMMITTEE REPORT

for 1982

to

CO-ORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

Members:

W.A. Patterson - Chairman,	NB Power
P.H. Newcombe	MECL
W.V. Wallace	N.S. Power

January 1983

TABLE OF CONTENTS

		Page
	EXECUTIVE SUMMARY	
1.	Benefits FROM Interconnected Operation	1
2.	Generation Maintenance Scheduling Summary	2
3.	Specialized Test Instruments and Major Spare Parts for Apparatus	3
4.	Economic Dispatch of Generation for Maritime Regional Loads	4

EXECUTIVE SUMMARY

Energy exchanges among the three utilities during 1982 resulted in a total reduction in operation cost hence a saving to utility customers of some 10.9 million dollars. Energy was delivered to Maritime Electric Ltd. from the Dalhousie Unit 2 in N.B. in which they have a 10% ownership participation.

Activities are ongoing to coordinate maintenance to provide economies in operations by the exchange of energy, reduction in overtime for maintenance and efficient management of fuel inventories. Information is also routinely exchanged on spare parts for apparatus and specialized test equipment to achieve regional efficiency in system maintenance.

Activities continue to evaluate a more integrated dispatch of generation for regional loads. This activity will be emphasized this year to consider opportunities that may exist to achieve further economies in operation to those being attained at present.

1. Benefits from Interconnected Operation

The benefits realized by the three interconnected electrical utilities are great. Many of the benefits are difficult to quantify, for example, the value of avoiding an interruption in supply to ten percent or more of a utility's customers for a period of several minutes or an hour. Such is a consequence frequently avoided by the instantaneous interchange of power when a large generator or power transmission line is forced out of service on a utility's system.

Benefits which are quantified routinely are the net savings and net income that result from Economy Energy transactions. For the calendar year ending December 31, 1982 these benefits were in the order of 10.9 million dollars, made up as follows:

Energy Transaction between	Volume of Interchange (KWh)	Benefits of Transactions
NB Power to NS Power Corp.	109,040,000	$ 1,354,060
NS Power Corp. to NB Power	25,838,000	$ 577,567
NB Power to Maritime Elect. Ltd.	392,677,000	$ 8,932,104
	527,545,000	$10,863,731

There was additional transmission of Entitlement Energy to Maritime Electric Ltd. of 83,333,000 KWh from the jointly owned unit at Dalhousie, N.B.

The transactions between N.B. and N.S. in 1982 were below those of 1981 due primarily to the below normal hydro experienced in 1982 versus an above normal hydro year in 1981. In 1981 N.S. Power made purchases of extra energy from NB Power when coal supplies were interrupted. Purchases were made rather than generated with more expensive oil.

It is forecast that energy exchanges between N.B. and N.S. will increase in 1983 with the commercial operation of Point Lepreau and the additional capacity in the New Brunswick/Hydro-Quebec Interconnection.

2. Generation Maintenance Scheduling Summary

The member utilities exchange information on several aspects of operation to allow coordinated maintenance for economies of operation, fuel inventory control and reliability of supply to customers. Elements coordinated include:

i) Information on availability of surplus energy. This relates to the spring run-off from the Saint John River watershed, the availability of energy from Hydro-Quebec, system loads and thermal generation available for service.

ii) The availability of coal for Economy Energy exchange in excess of owner utility needs.

iii) Transmission line and terminal station maintenance or construction. Such work may require scheduled energy exchanges or limit Economy Energy exchanges.

3. Specialized Test Instruments and Major Spare Parts for Apparatus

We reported in 1982 that member utilities have exchanged data on major spare parts stocked for apparatus that may have common application. This listing is updated periodically to ensure it is current.

In the course of commissioning the Point Lepreau Station in 1982 a 345,000 volt bushing was found to be defective. A spare bushing normally available in N.B. was being repaired by the manufacturer with a long delivery. Advantage was taken of borrowing a spare bushing from N.S. Power to secure the scheduled commissioning of Point Lepreau.

Joint use is being made by N.S. Power and Maritime Electric of a special, heavy tool required for servicing Brush generators. While servicing has not yet been required NB Power has a similar generator on the Moncton Combustion Turbine unit.

NB Power rented a mobile oil conditioning unit from N.S. Power when it was necessary to replace concurrently bushings in several transformers at the Eel River HVDC Station. This shortened the outage hence interruption in supply of energy from Hydro-Quebec.

4. Economic Dispatch of Generation for Maritime Regional Loads

The intentions of the Committee on Operations to have definitive information on the above has not been achieved. It is not known what additional benefits are achievable by a more integrated dispatch of generation in the region to meet the loads of the area. The tools and manpower to analyze this are not readily available or at least, not identified at this time.

This project will be a priority for the committee in the coming year. This is considered appropriate given the increases in generating capacity in NS Power and NB Power with the additional Lingan units 3 and 4 scheduled for service in 1983/84 and with Point Lepreau recently in commercial operation plus the pending increases in capacity of the Hydro-Quebec to NB Power interconnections.

SECTION II

MARITIME UTILITIES LOAD FORECAST
AND
LOAD AND RESOURCES REVIEW
1982-2000

Prepared by
Planning Subcommittee
of the
Coordinating Committee of the Maritime Electric Utilities

Members:

R.W. Brown - Chairman,	N.S. Power
J.L. Boomhower	MECL
D.G. Hayward	N.B. Power

January 1983

TABLE OF CONTENTS

		Page
	LIST OF TABLES	ii
1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION	5
3.	MARITIME UTILITIES LOAD FORECAST	6
4.	LOAD AND RESOURCES REVIEW	8
	4.1 Summary	8
	4.2 Resources Existing and Under Construction	9
	4.3 Load Requirements	10
	(a) Reserve Criterion for Peak Electrical Capability	10
	(b) Reserve Criterion for Sustained Electrical Capability	11
	4.4 Solution Procedures	11
	(a) Peak Electrical Capability Assessment	12
	(b) Sustained Electrical Capability Assessment	12
5.	OPTIONS FOR THE FUTURE	14

APPENDIX A: TERMS OF REFERENCE

APPENDIX B: 1982 PROPOSED WORK PLAN

APPENDIX C: CONSIDERATIONS FOR 1983

LIST OF TABLES

TABLE		PAGE
1.	Maritime Electric Utilities Principal Results of the 1982 Load Forecast	16
2.	Maritime Electric Utilities Coincident Peak Load Forecast (MW)	17
3.	Maritime Electric Utilities Load Forecast	18
4.	Maritime Electric Utilities Monthly Coincident Peak Demand Forecast (MW)	19
5.	Maritime Electric Utilities Monthly Energy Forecast (GWh)	20
6.	Maritime Electric Utilities Load and Resources Review - Peak Electrical Capability Criterion (MW)	21
7.	Maritime Electric Utilities Load and Resources Review - Sustained Electrical Capability Criterion (MW)	22
8.	Maritime Electric Utilities Load and Resources Review - Sustained Electrical Capability Criterion (GWh)	23
9.	Generating Station Capabilities - Net MW - Existing and Under Construction in New Brunswick	24
10.	Generating Station Capabilities - Net MW - Existing and Under Construction in Nova Scotia	25
11.	Generating Station Capabilities - Net MW - in Prince Edward Island	26
12.	Generation Additions Assumed for Load and Resources Review.	27

SECTION 1

EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

This report summarizes the load forecast and regional load-resources review for the combined New Brunswick, Nova Scotia and Prince Edward Island electrical systems to the year 2000.

The load forecast is based on the forecasts of the individual utilities. Average annual growth rates over the fiscal years 1981/82 to 1999/2000 are expected to be 3.5% and 3.3% for energy and peak electrical demand respectively.

The load-resources review examines the ability of the generation to reliably supply the forecast load. Reserve criteria for energy and capacity were applied to the Maritime Region. A surplus or deficit of the system capability is determined by comparison of generation resources with the forecast load. Annual results are given in Tables S1, S2 and S3.

The analysis is based on maintaining the same reserve criteria throughout the study period. Although not addressed in this report, it may be economic to carry a higher level of reserve. The report assumes no retirements and considers only unit additions which are presently under construction.

TABLE S1

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

PEAK ELECTRICAL CAPABILITY CRITERION (MW)

PEAK LOAD MONTH

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	REQ'D CAPACITY MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1983/1984	2984.	594.	3578.	2872.	1225.	630.	265.	365.	4462.	884.
1984/1985	3080.	614.	3694.	3172.	1225.	630.	265.	365.	4762.	1068.
1985/1986	3197.	637.	3834.	3572.	1225.	630.	265.	365.	5162.	1328.
1986/1987	3302.	658.	3960.	3572.	1225.	630.	265.	365.	5162.	1202.
1987/1988	3405.	679.	4084.	3572.	1225.	630.	265.	365.	5162.	1078.
1988/1989	3521.	702.	4223.	3572.	1225.	630.	265.	365.	5162.	939.
1989/1990	3635.	725.	4360.	3572.	1225.	630.	265.	365.	5162.	802.
1990/1991	3754.	748.	4502.	3572.	1225.	630.	0.	630.	5427.	925.
1991/1992	3873.	772.	4645.	3572.	1225.	630.	0.	630.	5427.	782.
1992/1993	3993.	796.	4789.	3572.	1225.	630.	0.	630.	5427.	638.
1993/1994	4117.	821.	4938.	3572.	1225.	630.	0.	630.	5427.	489.
1994/1995	4243.	846.	5089.	3572.	1225.	630.	0.	630.	5427.	338.
1995/1996	4374.	872.	5246.	3572.	1225.	630.	0.	630.	5427.	181.
1996/1997	4506.	899.	5405.	3572.	1225.	630.	0.	630.	5427.	22.
1997/1998	4644.	926.	5570.	3572.	1225.	630.	0.	630.	5427.	-143.
1998/1999	4786.	955.	5741.	3572.	1225.	630.	0.	630.	5427.	-314.
1999/2000	4934.	984.	5918.	3572.	1225.	630.	0.	630.	5427.	-491

TABLE S2

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

SUSTAINED ELECTRICAL CAPABILITY CRITERION (MW)

PEAK LOAD MONTH

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	REQ'D CAPACITY MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1983/1984	2984.	298.	3282.	2872.	838.	630.	265.	365.	4075.	793.
1984/1985	3080.	308.	3388.	3172.	835.	630.	265.	365.	4372.	984.
1985/1986	3197.	320.	3517.	3572.	843.	630.	265.	365.	4780.	1264.
1986/1987	3302.	330.	3632.	3572.	850.	630.	265.	365.	4787.	1155.
1987/1988	3405.	341.	3746.	3572.	867.	630.	265.	365.	4804.	1059.
1988/1989	3521.	352.	3873.	3572.	885.	630.	265.	365.	4822.	948.
1989/1990	3635.	364.	3999.	3572.	901.	630.	265.	365.	4838.	840
1990/1991	3754.	375.	4129.	3572.	918.	630.	0.	630.	5120.	991.
1991/1992	3873.	387.	4260.	3572.	936.	630.	0.	630.	5138.	878.
1992/1993	3993.	399.	4392.	3572.	953.	630.	0.	630.	5155.	763.
1993/1994	4117.	412.	4529.	3572.	970.	630.	0.	630.	5172.	644.
1994/1995	4243.	424.	4667.	3572.	987.	630.	0.	630.	5189.	522.
1995/1996	4374.	437.	4811.	3572.	1006.	630.	0.	630.	5208.	396.
1996/1997	4506.	451.	4957.	3572.	1023.	630.	0.	630.	5225.	268.
1997/1998	4644.	464.	5108.	3572.	1042.	630.	0.	630.	5244.	135.
1998/1999	4786.	479.	5265.	3572.	1060.	630.	0.	630.	5262.	-3.
1999/2000	4934.	493.	5427.	3572.	1080.	630.	0.	630.	5282.	-146.

TABLE S3

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

SUSTAINED ELECTRICAL CAPABILITY CRITERION (GW.h)

PEAK LOAD MONTH

FISCAL YEAR	SURPLUS GW.h
1983-84	590
84-85	732
85-86	940
86-87	859
87-88	788
88-89	705
89-90	625
90-91	737
91-92	653
92-93	568
93-94	479
94-95	388
95-96	295
96-97	199
97-98	100
98-99	-2
1999-2000	-109

SECTION 2

INTRODUCTION

2. INTRODUCTION

Over the past year, the CCMEU Regional Planning Committee examined the load forecasts and generation plans of New Brunswick, Nova Scotia and Prince Edward Island. A regional forecast extending to the year 2000 has been prepared. The individual generation expansion plans were combined and a regional load and resources review carried out.

This report summarizes the results of both the regional load forecast and the regional load resources review.

SECTION 3

MARITIME UTILITIES LOAD FORECAST

3. MARITIME UTILITIES LOAD FORECAST

Each member of the Maritime Electric Utilities undertakes a separate load forecast utilizing significant detailed analysis and statistics. Since each of the utilities are forecasting similar growth rates these individual forecasts have been combined to form the regional forecast.

Table 1 summarizes the expected long term growth in energy sales by sector. Total sales are forecast to grow at an average annual rate of 3.2% over the period 1981/82 to 1999/2000.

To develop the combined utility MW demand forecast, the individual utility forecasts could only be added directly together if their peak loads were expected to occur at the same time. Analysis of the past five years of hourly loads has shown this is not the case. On average, the peak load on the combined systems has been equal to approximately 98% of the sum of the individual peak loads. This historical relationship has been assumed to continue into the future, as shown in Table 2.

The annual energy and demand forecasts are given in Table 3. Between 1981/82 and 1999/2000 the forecast average annual growth rates of energy and demand are 3.5% and 3.3% respectively.

Tables 4 and 5 give a monthly breakdown of the annual energy and demand forecasts.

It should be noted that, at best, a forecast for such a long period can only be considered as an outlook. Since the forecast will be updated each year, such an outlook is adequate to define the utility generation and transmission needs over time.

SECTION 4

LOAD AND RESOURCES REVIEW

4. LOAD AND RESOURCES REVIEW

4.1 Summary

This is the second report on the Maritime Utilities Load Resource Review to be presented under the aegis of the Coordinating Committee of the Maritime Electric Utilities. It is intended to examine the ability of the regional utilities (New Brunswick, Nova Scotia and P.E.I.) generating facilities to meet the anticipated electrical demands of the area's consumers up to the year 2000.

The generation resources are comprised of the total generation capabilities from both existing generating stations and generating stations under construction. A listing of these committed resources is outlined by Province in Tables 9, 10 and 11. The required load which must be met is made up of the total forecast load for the Maritime electric utilities plus a reserve margin to ensure reliability.

New Brunswick uses two reserve criteria to assess their generation system. To examine the entire Maritime region, these two criteria: the reserve criterion for sustained electrical capability and the reserve criterion for peak electrical capability, have been applied to the combined New Brunswick, Nova Scotia and Prince Edward Island systems. The criteria are described in Section 4.3 of this report.

A surplus or deficiency in the system generation capability is determined by comparison of the generation resources with the

required load. These results can be used to assist in planning for additional generation.

An overall summary of the overall surpluses and deficits in generating capabilities is presented in Tables 6, 7 and 8. Only units under construction have been added in New Brunswick and Nova Scotia, as shown in Table 12. It can be seen in Tables 6, 7 and 8 that the Maritime electric utility systems are forecast to have sufficient resources to satisfy the reserve criteria for both sustained electrical capability and peak electrical capability to near the end of the century.

4.2 Resources Existing and Under Construction

The NB, NS and PEI systems are comprised of a mix of hydro, coal fired thermal, oil fired thermal and gas turbine generation and will in future include the Point Lepreau nuclear generating station and additional Lingan coal fired generation presently under construction. A summary of the capabilities of these committed supplies is given in Tables 9, 10 and 11.

In conducting this study and in the presentation of its results, the coal fired, oil fired, gas turbine and nuclear generation are lumped together into one category labeled thermal generation. This thermal generation is not energy limited. Thermal generation sources are therefore assumed to be available 100% of the time for each month of the study. Hydro generation, however, is energy limited and can only be utilized to the extent that low river flow and storage conditions will sustain it. In the New Brunswick system, the 95% probability

of firm energy from the hydro system is utilized while in Nova Scotia the low hydro energy condition is assumed to be 80% of the long term average energy output.

4.3 Load Requirements

The load requirement which must be met by the NB, NS, PEI resources consists of the forecast demand plus a specified amount of reserve.

The forecast demand for any month is the total system load which will most probably have to be supplied. It is determined using available information, experience, advice and detailed studies. A summary of these forecasted loads through the year 2000 is given in Table 3.

Reserve is the additional generation required as a safety margin to enable a utility to reliably meet the forecast demands in the event some generating capability is unavailable. The present New Brunswick policy is to use two reserve criteria in the assessment of the reliability of the generating system. For the purpose of this regional examination, these criteria have been applied to the combined NB, NS and PEI systems.

(a) Reserve Criterion for Peak Electrical Capability

The power reserve criterion for peak electrical capability requires that the total capacity available in each month be able to supply the load during the peak hour of the month with a surplus equal to 20% of the forecast firm load or the capacity of the largest unit, whichever is the larger.

To meet this criterion thermal and hydro generating units are considered available at their full rated capabilities.

(b) Reserve Criterion for Sustained Electrical Capability

The reserve criterion for sustained electrical capability suggests that the NB, NS and PEI systems jointly be able to withstand the continuous loss of the largest unit in the interconnected area. Under such reserve sharing arrangements, it is usual that the capacity of this largest unit does not exceed about 10% of the combined load of the participants. Because of anticipated participation sales of 265 megawatts from the Point Lepreau nuclear unit, a unit loading of 365 MW will be relied upon within the New Brunswick system from that unit. This 365 MW from Point Lepreau is classified as the largest unit during the early years of study. (See Section 4.4).

If the NB Power portion of the Point Lepreau loading or any unit loading on the NB Power system exceeds the Maritime reserve sharing agreement at any time, NB Power will undertake support arrangements with neighbouring systems. Such arrangements are made possible by NB Power's high capacity interconnections and interconnection agreements and are within the normally anticipated inter-utility relationships represented by these agreements.

4.4 Solution Procedure

A comparison is made between the generation resources and the load required for each month of the study period. A surplus or deficit in the capability to supply is determined on both the reserve for

the peak electrical capability and the reserve for the sustained electrical capability.

(a) Peak Electrical Capability Assessment

The required reserve for peak electric capability is added to the peak forecast load to determine the total peak load that would have to be met. This total load is compared with the sum of the generation supplies available from hydro, nuclear and thermal units to determine the surplus or deficit. In doing this calculation all generating units (hydro, nuclear and thermal) are considered to be available at their full net rated capability as given in Tables 9, 10 and 11. The results of this peak electrical capability assessment are presented in Table 6.

(b) Sustained Electrical Capability Assessment

Assessment of the sustained electrical capability of the system examines the ability of the generating supplies to meet, during every hour of each month, the forecast load plus the required sustained reserve. For this assessment nuclear and thermal units are assumed available at full rated capacity 100% of the time.

The low hydro generation (95% probability of annual energy in New Brunswick and 80% of the long term average annual energy in Nova Scotia) is utilized in determining a system capability to meet a sustained load demand. The available storage water is regulated in a manner to maximize the benefits on the system.

The load-resource balance of the NB, NS and PEI systems examines the system capabilities for each month of the year. This report only provides the details of the peak load month of the year since this condition has been used to define the system surpluses and deficiencies and hence indicates when new generation is required.

For the purposes of determination of both the peak and sustained reserve capabilities as outlined above, the largest unit in the combined NB, NS and PEI systems will be as follows:

1. April 1983 to November 1990 - Point Lepreau at 365 MW. While the unit has a 630 MW net output, 265 MW reservation of the Point Lepreau capacity has been set aside until 1990 for participation sales to other utilities.
2. December 1990 to 2000 - Point Lepreau at 630 MW.

SECTION 5

OPTIONS FOR THE FUTURE

5. OPTIONS FOR THE FUTURE

Generation planning activities in the coming years will be directed towards optimizing the supply system as opposed to adding generating capability solely for the purpose of meeting additional consumer requirements.

With the region having such a large percentage of its installed capacity in oil fired generation, efforts will be directed toward reducing the exposure to the insecurity of supply and cost escalation factors associated with offshore oil producers.

Specific emphasis will be placed on reducing this exposure through such means as converting existing units to alternate fuels where economically and technically feasible, as well as environmentally acceptable and through additional internal facilities and interconnections where they can be similarly justified. Such an approach will effectively relegate remaining oil fired generation to a useful reserve role.

The region is fortunate to have several options available for development. Within the time frame analyzed in this report some of the more prominent potential development could include additional nuclear and coal units, hydro, tidal and peat generation as well as expanded interconnection purchases which, if the right combination can be identified and developed, can have a significant impact on optimizing the power system needs up to the year 2000. The impact of conservation and load management as well as the potential use of alternate energy sources will also continue to be under review.

Since there are no specific needs for new generation within the region until the mid-1990's, there is sufficient lead time to select the best options for generation expansion to meet the defined deficiencies to the year 2000. The original expansion plan of generation additions under construction on which the load resource balances of Tables 6, 7 and 8 are based, is shown in Table 12.

TABLES

TABLE 1

MARITIME ELECTRIC UTILITIES

PRINCIPAL RESULTS OF THE 1982 LOAD FORECAST

(GWh)

SECTOR	FISCAL 1981-1982 ACTUAL	FISCAL 1999-2000	COMPOUND ANNUAL GROWTH RATE % 1982-2000
Domestic Sales	4226	7357	3.1
Commercial Sales	3977	6856	3.1
Industrial Sales	5679	10416	3.4
TOTAL SALES	13882	24629	3.2

TABLE 2

MARITIME ELECTRIC UTILITIES

COINCIDENT PEAK LOAD FORECAST (MW)

FISCAL YEAR	N.B.	N.S.	P.E.I.	TOTAL	COINCIDENT REDUCTION	COINCIDENT LOAD
1982-83	1579	1211	95	2885	55	2830
83-84	1715	1230	96	3041	57	2984
84-85	1765	1275	98	3138	58	3080
85-86	1821	1338	100	3259	62	3197
86-87	1875	1387	103	3365	63	3302
87-88	1929	1436	105	3470	65	3405
88-89	1982	1498	108	3588	67	3521
89-90	2033	1562	111	3706	71	3635
90-91	2085	1628	114	3827	73	3754
91-92	2137	1695	116	3948	75	3873
92-93	2189	1763	119	4071	78	3993
93-94	2243	1833	121	4197	80	4117
94-95	2296	1907	124	4327	84	4243
95-96	2351	1983	126	4460	86	4374
96-97	2405	2062	129	4596	90	4506
97-98	2460	2145	131	4736	92	4644
98-99	2517	2231	134	4882	96	4786
1999-2000	2575	2320	137	5032	98	4934

TABLE 3

MARITIME ELECTRIC UTILITIES

LOAD FORECAST

FISCAL YEAR	SYSTEM NET GWh*	PEAK HOURLY MW
1982-83	15070	2829
83-84	15910	2984
84-85	16981	3080
85-86	17738	3197
86-87	18445	3302
87-88	18966	3405
88-89	19656	3521
89-90	20184	3635
90-91	20819	3754
91-92	21450	3873
92-93	22087	3993
93-94	22745	4117
94-95	23421	4243
95-96	24111	4374
96-97	24825	4506
97-98	25570	4644
98-99	26338	4786
1999-2000	27132	4934

Total Period Average Annual Growth Rate:

GWh = 3.5%
MW = 3.3%

* Includes System Losses

TABLE 4

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT PEAK DEMAND FORECAST (MW)

FISC.YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1982/1983	2364	2220	2077	1962	2027	2098	2196	2533	2815	2830	2713	2593
1983/1984	2414	2264	2111	2028	2100	2180	2323	2671	2965	2984	2859	2736
1984/1985	2578	2422	2262	2139	2208	2284	2391	2752	3058	3080	2950	2822
1985/1986	2675	2512	2343	2216	2289	2367	2479	2856	3175	3197	3064	2929
1986/1987	2760	2590	2411	2283	2359	2437	2553	2944	3276	3302	3162	3024
1987/1988	2843	2667	2482	2349	2426	2508	2628	3033	3375	3405	3261	3116
1988/1989	2939	2755	2562	2425	2505	2590	2714	3134	3489	3521	3372	3222
1989/1990	3033	2845	2642	2502	2585	2671	2799	3235	3602	3635	3481	3327
1990/1991	3131	2935	2726	2581	2668	2756	2889	3338	3720	3754	3595	3434
1991/1992	3228	3026	2809	2661	2750	2841	2977	3442	3837	3873	3708	3543
1992/1993	3328	3119	2894	2740	2834	2928	3067	3548	3955	3993	3824	3652
1993/1994	3429	3213	2983	2823	2919	3016	3159	3655	4077	4117	3943	3765
1994/1995	3535	3314	3071	2909	3009	3107	3255	3769	4203	4243	4065	3882
1995/1996	3642	3412	3163	2996	3099	3199	3352	3883	4331	4374	4189	4000
1996/1997	3753	3517	3260	3087	3194	3298	3453	4001	4464	4506	4318	4123
1997/1998	3869	3625	3360	3183	3293	3400	3559	4125	4602	4644	4449	4249
1998/1999	3988	3738	3465	3284	3397	3506	3668	4253	4744	4786	4586	4380
1999/2000	4110	3853	3574	3386	3503	3617	3782	4383	4891	4934	4728	4516

TABLE 5

MARITIME ELECTRIC UTILITIES

MONTHLY ENERGY FORECAST (GWh)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1982/1983	1245	1151	1079	1084	1088	1083	1199	1294	1465	1532	1425	1425
1983/1984	1282	1183	1102	1137	1145	1141	1275	1386	1570	1641	1522	1526
1984/1985	1404	1301	1222	1230	1235	1226	1357	1456	1640	1713	1597	1600
1985/1986	1468	1361	1277	1284	1290	1280	1418	1520	1712	1789	1668	1671
1986/1987	1526	1415	1328	1338	1342	1332	1473	1580	1780	1860	1733	1738
1987/1988	1570	1456	1364	1373	1379	1368	1514	1625	1831	1914	1784	1788
1988/1989	1620	1502	1406	1417	1422	1411	1563	1677	1890	1978	1843	1847
1989/1990	1672	1548	1449	1461	1467	1454	1610	1728	1949	2040	1901	1905
1990/1991	1724	1598	1494	1506	1513	1499	1660	1781	2011	2106	1962	1965
1991/1992	1776	1647	1538	1551	1558	1544	1710	1835	2072	2171	2022	2026
1992/1993	1830	1696	1583	1596	1604	1589	1760	1890	2134	2236	2082	2087
1993/1994	1884	1746	1629	1644	1652	1635	1812	1946	2198	2304	2146	2149
1994/1995	1940	1799	1677	1692	1700	1684	1866	2003	2263	2373	2210	2214
1995/1996	1997	1852	1725	1742	1750	1733	1920	2061	2331	2444	2277	2279
1996/1997	2057	1907	1776	1794	1802	1784	1976	2122	2399	2517	2344	2347
1997/1998	2118	1964	1830	1849	1857	1838	2035	2105	2472	2591	2414	2417
1998/1999	2182	2024	1886	1906	1913	1893	2096	2250	2544	2669	2486	2489
1999/2000	2247	2085	1944	1964	1971	1952	2159	2316	2621	2749	2560	2564

TABLE 6

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

PEAK ELECTRICAL CAPABILITY CRITERION (MW)

PEAK LOAD MONTH

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	REQ'D CAPACITY MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1983/1984	2984.	594.	3578.	2872.	1225.	630.	265.	365.	4462.	884.
1984/1985	3080.	614.	3694.	3172.	1225.	630.	265.	365.	4762.	1068.
1985/1986	3197.	637.	3834.	3572.	1225.	630.	265.	365.	5162.	1328.
1986/1987	3302.	658.	3960.	3572.	1225.	630.	265.	365.	5162.	1202.
1987/1988	3405.	679.	4084.	3572.	1225.	630.	265.	365.	5162.	1078.
1988/1989	3521.	702.	4223.	3572.	1225.	630.	265.	365.	5162.	939.
1989/1990	3635.	725.	4360.	3572.	1225.	630.	265.	365.	5162.	802.
1990/1991	3754.	748.	4502.	3572.	1225.	630.	0.	630.	5427.	925.
1991/1992	3873.	772.	4645.	3572.	1225.	630.	0.	630.	5427.	782.
1992/1993	3993.	796.	4789.	3572.	1225.	630.	0.	630.	5427.	638.
1993/1994	4117.	821.	4938.	3572.	1225.	630.	0.	630.	5427.	489.
1994/1995	4243.	846.	5089.	3572.	1225.	630.	0.	630.	5427.	338.
1995/1996	4374.	872.	5246.	3572.	1225.	630.	0.	630.	5427.	181.
1996/1997	4506.	899.	5405.	3572.	1225.	630.	0.	630.	5427.	22.
1997/1998	4644.	926.	5570.	3572.	1225.	630.	0.	630.	5427.	-143.
1998/1999	4786.	955.	5741.	3572.	1225.	630.	0.	630.	5427.	-314.
1999/2000	4934.	984.	5918.	3572.	1225.	630.	0.	630.	5427.	-491

TABLE 7

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

SUSTAINED ELECTRICAL CAPABILITY CRITERION (MW)

PEAK LOAD MONTH

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	REQ'D CAPACITY MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1983/1984	2984.	298.	3282.	2872.	838.	630.	265.	365.	4075.	793.
1984/1985	3080.	308.	3388.	3172.	835.	630.	265.	365.	4372.	984.
1985/1986	3197.	320.	3517.	3572.	843.	630.	265.	365.	4780.	1264.
1986/1987	3302.	330.	3632.	3572.	850.	630.	265.	365.	4787.	1155.
1987/1988	3405.	341.	3746.	3572.	867.	630.	265.	365.	4804.	1059.
1988/1989	3521.	352.	3873.	3572.	885.	630.	265.	365.	4822.	948.
1989/1990	3635.	364.	3999.	3572.	901.	630.	265.	365.	4838.	840
1990/1991	3754.	375.	4129.	3572.	918.	630.	0.	630.	5120.	991.
1991/1992	3873.	387.	4260.	3572.	936.	630.	0.	630.	5138.	878.
1992/1993	3993.	399.	4392.	3572.	953.	630.	0.	630.	5155.	763.
1993/1994	4117.	412.	4529.	3572.	970.	630.	0.	630.	5172.	644.
1994/1995	4243.	424.	4667.	3572.	987.	630.	0.	630.	5189.	522.
1995/1996	4374.	437.	4811.	3572.	1006.	630.	0.	630.	5208.	396.
1996/1997	4506.	451.	4957.	3572.	1023.	630.	0.	630.	5225.	268.
1997/1998	4644.	464.	5108.	3572.	1042.	630.	0.	630.	5244.	135.
1998/1999	4786.	479.	5265.	3572.	1060.	630.	0.	630.	5262.	-3.
1999/2000	4934.	493.	5427.	3572.	1080.	630.	0.	630.	5282.	-146.

TABLE 8

MARITIME ELECTRIC UTILITIES

LOAD AND RESOURCES REVIEW

SUSTAINED ELECTRICAL CAPABILITY CRITERION (GW.h)

PEAK LOAD MONTH

FISCAL YEAR	SURPLUS GW.h
1983-84	590
84-85	732
85-86	940
86-87	859
87-88	788
88-89	705
89-90	625
90-91	737
91-92	653
92-93	568
93-94	479
94-95	388
95-96	295
96-97	199
97-98	100
98-99	-2
1999-2000	-109

TABLE 9

GENERATING STATION CAPABILITIES - NET MEGAWATTS [1] (MW)

EXISTING AND UNDER CONSTRUCTION

IN NEW BRUNSWICK

		Hydro			Thermal & Nuclear
Mactaquac	1	100	Grand Lake	5	4.8
	2	105		6	4.8
	3	103		7	12.6
	4	110		8	57.1
	5	107			
	6	109			
Beechwood	1	36	Chatham	1	11.4
	2	36		2	19.9
	3	43			
Tobique	1	10	Courtenay Bay	1	44.5
	2	10		2	13.0
				3	99.0
Grand Falls	1	15		4	99.0
	2	15			
	3	15	Dalhousie	1	102.0
	4	15		2	203.0 [2]
Milltown		4.1	Coleson Cove	1	335.0 [4]
				2	310.0 [3]
Sisson		8.5		3	335.0 [4]
Musquash		5.2	Lepreau Nuclear	1	630.0 [5]
			Moncton	1	22.5
			Grand Manan		3.8
Total Hydro		846.8 MW	Total Thermal & Nuclear		2307.4 MW

1 Net megawatt values are derived by subtracting station service requirements from Gross Megawatt Capability.

2 Dalhousie unit 2 capability is reduced by 20 MW to recognize the joint ownership arrangement with Maritime Electric of Prince Edward Island.

3 Coleson Cove Unit 2 available at 184 MW until November, 1985 and 310 MW thereafter because of participation sales.

4 Coleson Cove units 1 and 3 available at 198 MW each until November, 1985 and 335 MW thereafter because of participation sales.

5 Lepreau Nuclear - "In Service" - early 1982 - Commercial Date - April 1982.

TABLE 10

GENERATING STATION CAPABILITIES - NET MW
EXISTING AND UNDER CONSTRUCTION
IN NOVA SCOTIA

HYDRO	MW	THERMAL	MW
Avon	7	Glace Bay	93
Bear River	37 [2]	Lingan 1	150
Black River	21	Lingan 2	150
Dickie Brook	2	Lingan 3	150 [1]
Lequille	22	Lingan 4	150 [1]
Mersey	42	Point Tupper 1	67
Roseway	1	Point Tupper 2	145
St. Margarets	9	Trenton L.P.	55
Sheet Harbour	10	Trenton 5	141
Tusket	3	Tufts Cove 1	64
Harmony	1	Tufts Cove 2	98
Wreck Cove	223	Tufts Cove 3	145
		Water Street	161
		Maccan	13
		Combustion Turbine	205
TOTAL HYDRO [3]	378	TOTAL THERMAL	1787

1. Under construction, due Commercial in 1984.

2. Bear River increases in 1982 from 34 to 37 MW with the addition of 3 MW at Fourth Lake.

3. A 17 MW Tidal Unit owned by the Tidal Power Corporation is expected to be completed in mid 1983. Its output is netted from the system load.

TABLE 11

GENERATION STATION CAPABILITIES - NET MW

IN PRINCE EDWARD ISLAND

THERMAL	MW
Charlottetown	19.0
	19.0
	9.5
	7.2
	7.2
	3.8
	1.4
Borden	22.0
	12.8
Summerside	6.0
Dalhousie 2 (NBEPC Purchase)	20.0
TOTAL .	127.9

TABLE 12

GENERATION ADDITIONS ASSUMED

FOR

LOAD AND RESOURCES REVIEW

GENERATION ADDITION	YEAR ENDING MARCH
365 MW of Lepreau #1 Nuclear	1983
2 x 150 MW Lingan #3 and #4 Coal	1985
400 MW Coleson Cove Returned	1986
265 MW Lepreau #1 Returned	1991

APPENDIX A

TERMS OF REFERENCE

FOR

REGIONAL PLANNING SUBCOMMITTEE

The Regional Planning Subcommittee shall consist of at least one member from each of the utilities in the Maritime Region. The Sub-committee will meet at least twice yearly and will report to the Coordinating Committe of Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Planning Subcommittee shall, through whatever mechanism it deems necessary, Task Force appointment, consultant acquisition, etc., (subject to approval of CCMEU) undertake to do the following:

1. Prepare a load forecast showing the power and energy requirements of the region for approximately two decades. This load forecast shall be reviewed and updated if necessary annually.

2. Obtain the plans of the individual utilities and combine them to prepare a regional load-resource balance.

3. Identify possible benefits through short term deferral and or advancement of provincially scheduled units and will so notify the CCMEU.

4.(a) Considering all feasible regional alternatives, prepare an optimum long term generation expansion plan (including major transmission when necessary) without regard to individual utility boundaries and without regard to proposed provincial units which have not been committed to construction. The development of any optimum expansion plan will always start with the then existing and committed facilities of the three Systems.

(b) Prepare a report comparing the optimum regional expansion plan with the sum of the individual utility expansion plans and report its findings to the CCMEU.

5. Periodically assess the potential for imports from outside the region or exports outside the region, the constraints imposed by existing transmission system limitations and will recommend the need or otherwise for studies of incrementing transmission capacity.

6. Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

APPENDIX B

CCMEU REGIONAL PLANNING SUBCOMMITTEE

WORK PROGRAM

1982

WORK EFFORT:

- Update and revise the Regional Load Forecast.

- Examine the utility benefits of short-term deferral/advancement of scheduled generating units.

- Considering all practical significant regional generation and transmission alternatives, optimize the NB, NS, PEI future additions without consideration to what is owned or controlled by individual utilities.

- Update the load resource balance both for only generation additions presently under construction and for the combined system optimized expansion plan.

- Prepare formal reports on the Regional Load Forecast, Regional Load Resource Balances, possible generation advancement/deferral of generating units, and on the optimal regional plan.

CONSULTANT ASSISTANCE:

With the exception of the optimized Regional Expansion Plan, it is the intention of the subcommittee to have the work carried out by utility personnel.

Consultants may be used to develop the Regional Plan. Costs for consultants may be as high as $50-100 thousand but will most likely be considerably less than $50 thousand.

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APPENDIX C

CONSIDERATIONS FOR 1983

It was decided that in 1982 the entire work program including the development of an optimal regional plan would be carried out exclusively with utility staff. In addition to the work reported in this document, much has been accomplished in the development of basic assumptions and common criteria for the examination of combined system expansion alternatives.

Many generation options covering the time period from the present to the end of the century are being studied. Considerations of the Planning Subcommittee over the coming year include the following:

- Update the regional load forecast.
- Examine the utility benefits of short term deferral/ advancement of scheduled generating units.
- Continue the development of a regional plan.
- Produce the appropriate load resource balance reports.

- SECTION III -

RESEARCH AND DEVELOPMENT IN THE MARITIME ELECTRIC UTILITIES 1982 ANNUAL REPORT

Prepared by the
Research and Development Subcommittee
of the
Coordinating Committee of the Maritime Electric Utilities

Members:

J. Kiuru - Chairman,	N.S. Power
J.A. Lea	MECL
P.J. Whalen	N.B. Power

January 1983

CONTENTS

		Page
1.0	Executive Summary	1
2.0	Introduction	2
3.0	Terms of Reference	3
4.0	Work Plan for 1982	5
5.0	Summary of Achievments - 1982	6
6.0	Proposed Activities for 1983	7
7.0	Status of Current R&D Activities in the Maritime Electric Utilities	8
	7.1 New Brunswick	8
	7.2 Nova Scotia	12
	7.3 Prince Edward Island	17

1.0 EXECUTIVE SUMMARY

This second annual report of the Research and Development Subcommittee of the Co-ordinating Committee of Maritime Electric Utilities (CCMEU) covers the Subcommittee's activities during 1982.

The Subcommittee is pleased to report a significant achievement in the establishment of an R&D communications structure in all member utilities. Each utility now has an organization for the internal dissemination of R&D information as well as an R&D Steering Committee which meets several times a year.

The Subcommittee's Terms of Reference were revised to recognize the possibility of joint regional R&D projects and joint bids for projects by several member utilities. This makes possible regional participation with a minimum drain on the manpower resources of individual utilities.

During 1983 the joint project activity will be further developed along with an internally-conducted study of regional R&D priorities.

The reports on the status of R&D projects in the Maritime Electric Utilities (Section 7) are under continual review with updates scheduled on a semi-annual basis. Recommendations for pooling of resources and results are made whenever such activity will benefit the region.

2.0 INTRODUCTION

This is the second annual report of the Research and Development Subcommittee of the CCMEU which was formed in March 1982.

The summary of 1982 activities and the proposed activities for 1983 indicate a continuing increase and improvement in co-operative activity in which the benefits of R&D in the Maritime Electric Utilities can now be shared among all the members.

The Terms of Reference revised in the Fall of 1982 reflect the intention to increase co-operation in the possible initiation of joint projects and joint R&D proposals enabling the combined participation of the member utilities to realize projects heretofore considered outside the capability of an individual utility. A continued effort will be made in 1983 and beyond to promote a regional approach to R&D within the Maritimes.

3.0 TERMS OF REFERENCE

The Regional R&D Subcommittee shall consist of at least one member from each of the province-wide utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional R&D Subcommittee shall undertake the following:

3.1 Report on all electric utility-related R&D activities that are currently underway in the Maritime provinces.

3.2 Set up procedures whereby it is informed of any individual utility initiatives in R&D activity and attempt to achieve regional interest and participation in these activities.

3.3 Promote and implement the free exchange of R&D project information, procedures and results in order to share the results of all R&D projects undertaken by each utility. Recommend joint projects when such co-operation would benefit the region.

3.4 Review current and planned R&D expenditures by the member utilities and to recommend how maximum regional benefit can be obtained from these expenditures; this would include, but not be limited to the recommending against duplication of R&D effort.

3.5 Review the current and proposed R&D participation by member utilities in the CEA R&D program, and recommend actions which will enhance the regional benefit of these projects. This includes the possibility of joint proposals and joint bids on R&D contracts by member utilities.

3.0 TERMS OF REFERENCE (cont'd)

3.6 Review R&D activity undertaken by utilities in Canada that is outside the umbrella of the Canadian Electrical Association and obtain the results of that activity for regional use.

3.7 Recommend to the CCMEU those R&D initiatives that the Subcommittee thinks should be taken within the region.

3.8 For projects which are identified by all member utilities to be of regional interest, but which cannot be funded by CEA or other R&D Funding, the Subcommittee shall request funding by the member utilities through the CCMEU.

3.9 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution of members of the CCMEU and its other Subcommittees.

3.10 Submit a proposed work program and an expected budget requirement annually to the CCMEU as directed.

4.0 WORK PLAN FOR 1982

During the year 1982 the R&D Subcommittee proposes to carry out the following activities:

4.1 Technology Transfer

Implement a system for R&D technology transfer generally in accordance with Section 3 of the 1981 Annual Report.

4.2 Study of Regional R&D Priorities

Develop a proposal for a "Study to Identify Regional R&D Priorities". The Study would likely be done by an outside consultant and would identify areas of regional significance that have not been identified by the individual member utilities. The Subcommittee would develop the proposal and estimated budget for submission to the CCMEU for funding approval in 1982.

4.3 New Regional R&D Projects

Continue the investigation of, and if all members agree on need, develop proposals and budget estimates for possible regional R&D programs on items such as:

4.3.1 Corrosion in Marine Atmospheres
4.3.2 Optimization of Residential Heating
4.3.3 Pooling of Load Research and Load Management Procedures and Data

4.4 Update on Maritime Utility Research Programs

The on-going mandate of the R&D Subcommittee is to review and update reports of the R&D activities in the member utilities. The latest summary appearing in Part 5 of the 1981 annual report will be reviewed and updated both Spring and Fall of 1982.

5.0 SUMMARY OF ACHIEVEMENTS - 1982

5.1 A formal R&D communications structure is now in place in all member utilities. Thus, a major recommendation of the Subcommittee made October 1981 and subsequently approved by the CCMEU has now been achieved.

5.2 The Subcommittee recommended a formal study of regional R&D priorities and requested funding from the CCMEU. Since funding to enable a study to be carried out was not available, the Subcommittee has been studying means of accomplishing at least part of the study using internal resources.

5.3 The Committee continued the update of a survey of R&D activities within the region. The latest results are included in section 7 of this report.

5.4 The Subcommittee conducted an in-depth review of its Terms of Reference and received approval for revisions which clarify and enlarge the Subcommittee's mandate with the addition of the following:

(a) recognize the possibility of joint R&D projects among several member utilities.

(b) recognize the possibility of joint proposals and joint bids on R&D contracts.

(c) recognize the possibility of projects under the umbrella of the CCMEU.

5.5 In December 1982 a study was begun to consider the merit of regional representatives on the CEA R&D Subcommittees rather than utility representatives as is now the case.

6.0 PROPOSED ACTIVITIES FOR 1983

(These activities have been submitted for CCMEU approval)

6.1 Joint Bids and Proposals

Develop procedures for joint proposals and joint bids for possible R&D projects by several member utilities. This will require careful screening of project requests in order to determine potential regional benefits as well as joint participation capabilities.

6.2 Develop Joint R&D Projects

Develop proposals for suitable joint projects for the region for submission to the CEA R&D Organization.

6.3 Study of Regional R&D Priorities

Determine possible methods for conducting a study of regional R&D priorities (recommended by the Subcommittee in 1982) using only Subcommittee and member utility resources considering that no funding or external assistance is available.

6.4 Update of Utility R&D Activity

Continue to update reports of R&D activity in the member utilities.

6.5 Study Regional Representation on CEA R&D Subcommittees

Complete a study for the CCMEU evaluating the merits of regional rather than individual utility representation on various CEA Research and Development subcommittees. (Study begun in December 1982)

7.0 STATUS OF CURRENT R&D ACTIVITIES IN THE MARITIME ELECTRIC UTILITIES

7.1 New Brunswick Electric Power Commission R&D Projects

7.1.1 Flue Gas Desulfurization

Objective - To investigate a unique catalytic flue gas desulfurization concept with a small-scale reactor located at the Grand Lake generating station. The concept envisages conversion of the sulfur dioxide to the trioxide form over a vanadium catalyst in the presence of solid oxide particles. Conversion of the sulfur oxides to sulfates accomplishes the desired gas-phase removal.

Status - Under the guidance of researchers from U.N.B.'s Chemical Engineering Department, the project will be completed by early fall 1982. Preliminary findings show that the conversion of SO_2 to SO_3 is indeed feasible, however, pickup by most solid oxides is quite slow.

Cost - $66,000
Funding - 100% by the Canadian Electrical Association
Contact - Phil Whalen (NBEPC)

7.1.2 Coal Washing

Objective - To determine the costs and benefits and thus the overall feasibility of cleaning all or a portion of current N.B. coal production prior to use in N.B. Power's thermal generating stations. This assessment includes a preliminary investigation into the most promising coal cleaning techniques.

Status - The benefits of washing N.B. coal, has been assessed and is bassed on a detailed review of coal equipment maintenance and reliability factors, using a methodology

developed by researchers at the Tennessee Valley Authority. A preliminary evaluation of coal cleaning costs has been completed and includes an assessment of potential techniques and expected performance. The data produced in these two reports is currently (fall 1982) being reviewed to determine whether further study is warranted.

Cost - $5,000 plus N.B.E.P.C. internal staff costs
Funding - 100% by N.B. Power
Contact - Phil Whalen (NBEPC)

7.1.3 Coal-Water Mixture Combustion Demonstration (CARBOGEL AB)

Objective - In co-operation with the federal department of Energy, Mines and Resources (EM&R) and the Cape Breton Development Corporation (CBDC), N.B. Power is participating in a program which seeks to demonstrate the technical aspects of producing and using a high quality coal-water fuel. The fuel will be produced by CBDC in a pilot plant located at their Victoria Jct. wash plant near Sydney, N.S. The combustion trials will be performed on approximately 6,000 tons of fuel at N.B. Power's Chatham generating station.

Status - The project has been underway since early 1982 and work to date has essentially dealt with preparing both units at the Chatham Station for the combustion trials. It is expected that CBDC will be producing coal-water fuel in the spring of 1983 and the combustion trials will commence shortly thereafter. The major preparatory effort relates to the design and lab testing of suitable fuel burners. It is expected that this work will be performed chiefly by external specialists.

Cost - Total estimated at $5.5 million
- N.B. Power estimated portion $3.2 million

Funding - 100% by federal department of Energy, Mines & Resources

Contact - Dave Rankin (NBEPC); Roy MacLean (CBDC)

7.1.4 Waste Heat Utilization

Objective - To expand the successful demonstration programs which have been supported at the N.B. Power's Grand Lake generating station over the past 5 years. Current projects include the following:

- completion of the demonstration of the application of waste heat in a hatching and early rearing facility for brook trout and salmon

- expansion of the successful, pond-based, accelerated rearing facilities for brook trout and salmon for use in provincial restocking programs and limited direct marketing applications

- construction of a 1/2-acre surface-heated greenhouse facility to demonstrate the application of low-grade waste heat for supplementary hearing (approximately 50%)

Status - The performance assessment of the rearing and hatching facility is nearing completion and a final report is expected this year. The other two projects are currently in the construction phase with operation scheduled to begin late in 1982.

Cost - Estimated to total over $1 million for capital, exclusive of operation costs

Funding - several agencies participating including:

- N.B. Power
- N.B. Coal
- N.B. Energy Secretariate
- Federal Energy, Mines & Resources
- CEA
- Federal Fisheries and Oceans

Contact - John Mercer (NBEPC)

7.1.5 Conservation & Renewable Energy

Objective - To support the development and tesing of innovative approaches to the overall optimization of domestic energy use.

Status - Several demonstrations and studies have been completed in recent years, including:

- demonstration of small-scale wind energy systems
- demonstration of a ground-water-source heat pump in a 1000-square-foot model home
- demonstration of passive and active solar heating systems in various N.B. Power district offices
- study of the energy requirements of alternative domestic hot water heating systems.

Current efforts include the assessment of the effect of various conservation devices on usage patterns. In addition, N.B. Power is participating in a study, supported by the Canadain Electrical Association, which will produce a universal domestic energy audit procedure.

Cost - Estimated to total over $500,000

Funding - Approximately 70% internal - 30% EMR/CEA

Contact - Reg Gulliver (NBEPC)

7.2 Nova Scotia Power Corporation R&D Projects

7.2.1 Marginal Cost-Based Peak Load Pricing and Load Control Study

Objectives

(1) To ascertain whetner certain pricing and load control systems can, in fact, lead to more efficient utilization of NSPC's capital and energy resources at a net benefit to customers and Corporation;

(2) To investigate the theoretical background and applicability of marginal cost pricing concepts; and

(3) To develop, in the process, modeling techniques for load and sales forecasting, as well as system and financial planning.

Description - The study deals with many subsidiary issues which are critical to the achievement of the objectives. Among tnese will be the cost effectiveness of metering and load control systems, sample selection techniques, corporate operating procedures, administrative feasibility of alternative rate designs and software system design.

Status - The project was started in April 1979 with initial studies relating cost of service, cost allocation and marginal cost conducted by consultants.

Work is nearing completion on the acquisition of the load research system, selection of customers and software design for data collection and analysis.

Equipment installation is progressing with a target date of 1983 for computerized collection of metering data from 860 sites throughout the province covering all classes of service. Information on kW and VAR demand for every 15 minutes will be recorded. The data is collected using the telephone system to call each collector approximately every 5 days.

Cost - $3,000,000 for equipment and external consulting.
- NSPC manhours not included in cost.

Funding - Total of $3,000,000 funded by 80% by Federal government and 20% by Province of Nova Scotia.
- Joint participation by Maritime Telegraph and Telephone Company.

Contact - Jack Kiuru (NSPC)

7.2.2 Fluidized-Bed Combustion

Objective - To study the feasibility of converting a 150 MW utility boiler to Atmospheric Fluidized-Bed Combustion (AFBC) and to select a suitable unit on the NSPC system for conversion.

Status - Coal Processing Consultants (CPC) have completed a study of comparing the suitability of installing a utility-size AFBC boiler to either at Point Tupper or Trenton Generating Station, and to review and evaluate the various

technical risks associated with AFBC technology. A subsequent study to develop a 10,000-hour Corrosion Test Work Program has been recommended.

Contact - A. J. Neale (NSPC)

7.2.3 Atmospheric Fluidized Bed Studies

Objective - To build an atmospheric fluidized bed (AFBC) test rig and use it for investigation of corrosion and erosion of tubing materials in the combustor.

Description -NSPC are managing the project which includes the design, construction, commissioning and operation of the test rig with a bed size of 1m by 1m. All in-bed and convection pass tubes will be water-cooled, air-cooled or uncooled and the rig will generate no steam.

Combustion Engineering Canada Limited are involved in the construction of the rig proper while NSPC are responsible for the balance of the project. Expected completion of construction is spring 1983 with 10,000-hour test program to be completed early in 1986.

Funding - Energy, Mines and Resources Canada

Contact - G. D. Lethbridge (NSPC)

7.2.4 Coal-Liquid Mixtures

NSPC is maintaining a watching brief on all developments regarding Coal-Liquid Mixtures (CLM) both coal-oil and coal-water because of the possibility of technology development to allow low-cost conversion of present oil-fired boilers to CLM.

Through its membership in the Coal-Liquid Mixtures (CLM) Working Group, NSPC is keeping up to date on current research emphasizing the increasing activity in the Atlantic Provinces.

When technically feasible and economic, NSPC expects to participate in a full-scale 150 MW utility boiler conversion to CLM.

7.2.5 Fly Ash Testing and Marketing

Dry fly ash handling equipment was installed and has been operating at Lingan since 1982-07-00. Sampling and testing have been carried out since 1979 to determine the quality of fly ash as a cement replacement in concrete mixes. Marketing surveys and studies are underway to determine the sales potential of this product in the Maritimes.

7.2.6 Annapolis Tidal Project

This pilot project of building a tidal power plant at Annapolis is being undertaken by the Tidal Power Corporation with NSPC as prime consultants. Construction is currently underway and initial tesing is scheduled for spring 1983.

The project employs the largest Stra-flo turbine ever built, a type that is being considered for the larger Fundy Tidal project. This plant is strictly experimental and will be instrumented to enable a wide range of data to be gathered. It will be remote-controlled from one of the NSPC power control centres. Unit size is approximately 17 MWe and the runner diameter is 7.6 m.

Cost - $46 million (estimated)

Funding - Federal Government (EM&R) $25 million
- Tidal Power Corporation remainder

Contact - B. V. McDonald (NSPC)

7.2.7 Wind Generation Experiment

A windmill has been installed at Wreck Cove with the power generated being utilized to pump water into the Wreck Cove headrace. The pump is also capable of operating from the 23 kV power system. The windmill went into operation early 1981. Initial operation was characterized by wide power swings. Following a detailed analysis, the manufacturer has offered to replace the synchronous generator with an induction unit, scheduled for completion spring of 1983.

Cost - $1,425,000 (estimated)

Funding - Federal (EM&R) $600,000
- NSPC $825,000

Contact - B. V. McDonald (NSPC)

7.2.8 Wind Resource Monitoring

The Nova Scotia Power Corporation has set up equipment to monitor wind resources at three sites in the province: Surge Lake and French Lake in the Wreck Cove area of Cape Breton Island and Bloody Creek in the Annapolis Valley.

Contact - B. V. McDonald (NSPC)

7.2.9 Heat Pump - Guysborough

The Guysborough regional office has been fitted with an air-to-air heat pump to supply building heat. It is separately instrumented so that the amount of electricity for

building heat can be determined. A similar-sized office building in Havre Boucher is equipped with electric baseboard heating with separate metering to enable comparison. Data has been recorded since fall of 1980. The final report will give an analysis of cost, efficiency, reliability, etc. of the two heating methods.

Contact: D. R. Barteaux, (NSPC)

7.2.10 Fibre Optics in Substations

The Nova Scotia Power Corporation has installed fibre optic cables at seven sites for communication of station control, protection and voice information between the substation and adjacent microwave sites. Performance is monitored and compared with that of conventional wired equipment at similar sites. Some interface equipment was designed and built by NSPC personnel.

Contact - G. P. Cottreau (NSPC)

7.3 Maritime Electric Company Limited R&D Projects

7.3.1 Wind Energy Conversion System - Mount Pleasant, P.E.I.

Objective - To confirm the theoretical performance predictions of an array of six large-scale Wind Energy Conversion Systems.

Status - Under review pending financial support

Sponsorship - The proposal has been initiated jointly by Maritime Electric and the P.E.I. Energy Corporation.

Cost - $5.0 million (estimate)

Contact - J. A. Lea, (MECL)

7.3.2 Wind Test Site - North Cape, P.E.I.

Description - Facilities are available to Government and private industry for field testing of windmills. Laboratory facilities provide data acquisition for the determination of unit performance.

Status - In operation

Sponsorship - Site is owned and operated by Institute of Man and Resources.

MECL Involvement - MECL has agreed to purchase output on an "oil displacement" basis. MECL also provides technical assistance on a limited basis.